APPENDIX C
Water Supply Cost and Funding Information

INTRODUCTION

This Appendix provides supplemental and supporting information to the water supply cost and funding information presented in the planning and support documents.

Water Supply Cost

This section contains information on the origination of several of the cost estimations for the water source options and treatment technologies presented in this plan.

Cost Estimating and Economic Criteria

In this portion of the appendix, a memo (**Exhibit C-1**) summarizing the approach on the origination and updated cost information presented in Chapters 3 and 5 of the UEC Planning Document is presented. The approach discussed in this consultants memo was supported by the Florida Department of Environmental Protection (FDEP) and water management districts in updating costs to 2005 dollars from the St. John's River Water Management District's (SJRWMD) Special Publication SJ97-SP3 titled, *Water Supply Needs and Sources Assessment – Alternative Water Supply Strategies Investigation – Water Supply and Wastewater Systems Component Cost Information*. The cost information provides a consistent set of definitions and criteria for the development of comparable planning level, life cycle, cost estimates for water supply and wastewater treatment alternatives.

Aquifer Storage and Recovery

The section provides a table containing the assumptions used in developing cost information regarding aquifer storage and recovery.

Water Supply Funding

UEC Alternative Water Supply Funding

A table is provided in this section itemizing UEC projects that have received funding from the Districts Alternative Water Supply Funding Program between Fiscal Year (FY) 1997 and FY 2004.

WATER SUPPLY COST

Cost Estimating and Economic Criteria

Please refer to the following memo (**Exhibit C-1**), which summarizes cost information.

Exhibit C-1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan and East Central Florida Water Supply Initiative (Third Draft).

TECHNICAL MEMORANDUM CH2MHILL

Cost Estimating and Economic Criteria for 2005 District Water Supply Plan and East Central Florida Water Supply Planning Initiative (third draft)

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Purpose

This technical memorandum (TM) provides cost definitions and cost estimating and economic criteria to be used in the development of water supply facilities costing for the 2005 District Water Supply Plan (DWSP). These criteria are developed in support of SJRWMD's optimization and decision models and will be applied to all cost estimates and economic comparisons developed as part of the 2005 DWSP to ensure that all costs are directly comparable.

These criteria are also being be applied (with some modifications) to the ongoing East-central Florida Water Supply Planning Initiative (ECFWSPI) projects cost estimates. The ECFWSPI will conclude in early 2004 and the resulting report will update the 2000 DWSP.

This TM provides a consistent set of definitions and criteria for the development of comparable planning level life cycle cost estimates for all water supply alternatives.

Definitions

The following definitions will be used in the 2005 DWSP project and should be adhered to when applicable. For the most part, these definitions are the same as used by SJRWMD, as well as by Southwest Florida Water Management District (SWFWMD), in the development of the initial DWSPs.

Construction Cost

The construction cost is the total amount expected to be paid to a qualified contractor to build the required facilities at peak design capacity.

COST ESTIMATING CRITERIA TM 09082003.DOC 1

Exhibit C-1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan and East Central Florida Water Supply Initiative (Continued).

Non-construction Capital Cost

Non-construction capital cost is an allowance for construction contingency, engineering design, permitting and administration associated with the constructed facilities.

Land Cost

The market value of the land required to implement the water supply option.

Land Acquisition Cost

The estimated cost of acquiring the required land, exclusive of the land cost.

Total Capital Cost

Total capital cost is the sum of construction cost, non-construction capital cost, land cost, and land acquisition cost.

Operation and Maintenance Cost

The estimated annual cost of operating and maintaining the water supply option when operated at average day capacity.

Equivalent Annual Cost

Total annual life cycle cost of the water supply option based on service life and time value of money criteria established for this project. Equivalent Annual Cost accounts for Total Capital Cost and O&M costs with facility operating at average day design capacity.

Present Worth

The equivalent present value of current and future expenditures for a specified planning period.

Unit Production Cost

Equivalent Annual Cost divided by annual water production. The Unit Production Cost will be expressed in terms of dollars per 1,000 gallons.

Criteria

Cost estimating and economic criteria are guidelines for estimating costs associated with water supply options.

Peak Flow Ratio

Capital cost of water supply facilities will be based on maximum installed capacity designed to accommodate peak or maximum daily flow (MDF) requirements. O&M costs and annual water production are based on the average daily flow (ADF) produced. The peak flow ratio (MDF/ADF) for an individual water supply system depends on the demand characteristics of the service area. For public supply systems the peak ratio is generally at least 1.25 for large systems and can be greater than 2.0 for small systems.

Exhibit C-1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan and East Central Florida Water Supply Initiative (Continued).

For water supply options where the service area peak flow ratio is known, the known value can and should be used in the cost estimating and economic calculations. For regional planning applications, including application of SJRWMD's decision model, a peak ratio of 1.5 will be used. This MDF/ADF ratio was applied in the 2000 DWSP.

Cost Index

Engineering News Record (ENR) publishes a Construction Cost Index (CCI) that can be used to adjust the cost basis of a given construction project for past and future times. The ENRCCI is based on the following construction items: 200 hours of common labor at the 20-city average of common labor rates, plus 2,500 pounds of standard structural steel shapes at the mill price prior to 1996 and the fabricated 20-city price from 1996, plus 1.128 tons of Portland cement at the 20-city price, plus 1,088 board-ft of 2 x 4 lumber at the 20-city price.

Because much of the work associated with development of the 2005 DWSP will be completed in the coming years and reported in 2005, all cost estimates, for the 2005 DWSP, will be expressed in estimated year 2005 dollars. Estimating year 2005 costs involves the projection of the year 2002 ENRCCI (2002 mean annual ENRCCI = 6,538) to year 2005 ENRCCI. Exhibit 1 shows the recent historic ENRCCI trend, as well as, ENRCCI projections for years 2003, 2004, and 2005. The projected ENRCCI for year 2005 is approximately 7,000. This projection is based on the historically observed 2.34% mean annual growth rate for the period 1997 to 2002.

EXHIBIT 1
ENRCCI Projection to 2005
Cost Estimating & Economic Evaluation Criteria

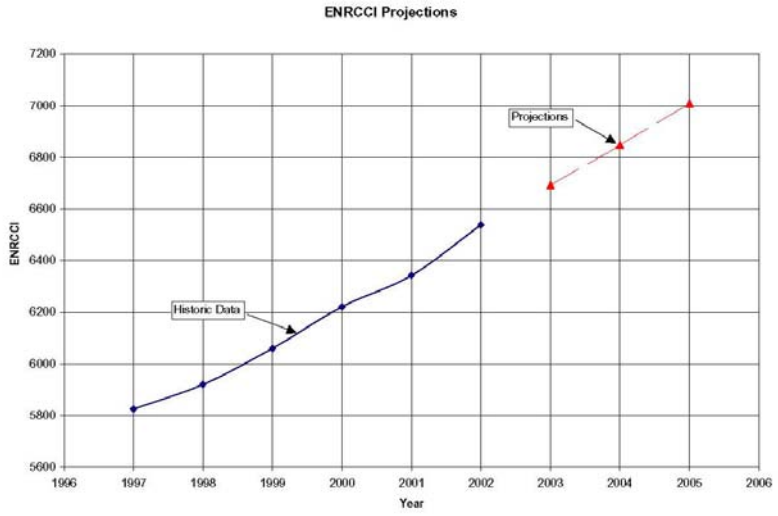

Exhibit C-1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan and East Central Florida Water Supply Initiative (Continued).

The cost basis for the 2000 DWSP was March 1996 with a corresponding ENRCCI value of 5537. Using the projected year 2005 ENRCCI value of 7000 represents an increase in the cost basis of about 26 percent.

The estimated 2005 ENRCCI will be applied to all 2005 DWSP cost estimates. However, the conceptual planning level cost estimates currently being prepared for the ECFWSPI projects will be expressed in current dollars. The cost basis for the ECFWSPI estimates is April 2003, with a corresponding ENRCCI value of 6635.

Non-construction Capital Cost

Non-construction capital cost will equal 45% of the planning level estimated construction cost. This includes a 20% allowance for construction contingency and a 25% allowance for engineering design, permitting, and administration. This value is unchanged from the 2000 DWSP.

Land Cost

Unit land cost ($/acre) for each parcel are based upon land use classification and size as supplied by SJRWMD land acquisition staff for the 2000 DWSP. An evaluation of current land values, as per recent SJRWMD land purchases, did not provide an adequate basis for revising the 2000 DWSP values. If actual site-specific land values are available for a given parcel and water supply option the site specific value should be used in lieu of these typical regional values.

General land use classifications include urban, suburban, and rural. Size is based on acreage, where *small* refers to parcels 50 acres or less in size and *large* refers to parcels greater than 50 acres in size. Exhibit 2 provides the unit land cost matrix for parcels located within SJRWMD.

EXHIBIT 2
Unit Land Cost for Parcels
Cost Estimating & Economic Evaluation Criteria

Land Use Classification	Parcel Size	
	Small (< or = 50 acres) ($/acre)	Large (> 50 acres) ($/acre)
Urban	$ 100,000	N/A
Suburban	$ 20,000	$ 10,000
Rural	$ 5,000	$ 3,000

Unit land costs ($/ft²) for pipeline corridors vary based on the land use classification and whether or not the parcel is adjacent to public right of way (ROW) or in an undeveloped (new) area, and whether an easement or full ROW is required. Exhibit 3 provides the unit

Exhibit C-1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan and East Central Florida Water Supply Initiative (Continued).

cost matrix for pipeline corridors located within SJRWMD. These values are the same as used in the 2000 DWSP.

EXHIBIT 3
Unit Land Cost for Pipeline Corridors
Cost Estimating & Economic Evaluation Criteria

Land Use Classification	Adjacent to Public ROW		New Area	
	Easement ($/ft2)	ROW ($/ft2)	Easement ($/ft2)	ROW ($/ft2)
Urban	$ 4.00	$ 6.00	$ 3.00	$ 5.00
Suburban	$ 1.50	$ 3.00	$ 1.00	$ 2.00
Rural	$ 0.75	$ 1.00	$ 0.50	$ 0.75

Land Acquisition Cost

Land acquisition cost estimates will vary as a function of condemnation requirements, as follows:

- 12% of land value for known non-condemnation parcels
- 25% of land value for know condemnation parcels
- 18% of land value where condemnation status is unknown

In most case, at the conceptual regional planning level of analysis, it is anticipated that condemnation status will be unknown and therefore the 18% value will apply. A single value of 25% was used in the 2000 DWSP.

Interest Rate

SJRWMD recently conducted an analysis of the potential financial impacts of alternative water supply development. This analysis conducted by Burton and Associates produced a final report entitled , *Financial Impact of Alternative Water Supply*. The financial impacts analysis project employed an interest rate of 6% per year in all water rates calculations. Current AAA rated, long term municipal bond interest rates (approximately 5% per year) are lower than the value chosen for the water rates impact analysis. However, the 6% was chosen by SJRWMD based on the expectation than the current very low municipal bond interest rates are not likely representative of future rates, but also recognizing that rates are unlikely to rise excessively in the foreseeable future.

In order to maintain compatibility among the existing ongoing SJRWMD water supply related projects, an interest rate of 6% is being used for all ECFWSPI projects.

For the 2005 DWSP, the interest rate to be used in all economic analysis calculations will be based on the current (FY03) federal water resources planning rate. This rate is set annually, by the US Bureau of Reclamation for use by all federal agencies, is based on US Treasury Bond rates. Although it is adjusted annually, it cannot be changed by more than ¼ percent

Exhibit C-1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan and East Central Florida Water Supply Initiative (Continued).

in any single year. The current (FY03) federal planning rate, as published in the Federal Register (December 13, 2002) , is 5.875%. This value will be used in all economic calculations for the 2005 DWSP.

Economic Life of Facilities

The economic service life of facilities is based on the criteria adopted for the 2000 DWSP. Exhibit 4 provides the economic service life, in years based on component type. These values will be used in all annual cost and present worth calculations.

In all cases, land is considered a permanent resources and therefore has an infinite service life.

EXHIBIT 4
Economic Service Life
Cost Estimating & Economic Evaluation Criteria

Component Type	Service Life (years)
Water Conveyance Structures (pipelines, collection and distribution systems)	40
Other Structures (buildings, tankage, site improvements, etc.)	35
Wells	30
Process and Auxiliary Equipment (treatment equipment, pumps motors, mechanical equipment, etc.)	20
Reverse Osmosis Membranes	5

The non-construction capital costs associated with a given project, or major project component, will also be distributed in proportion to expected service life of the project. For example, if a given project, or major project component, has an economic service life of 20 years then the non-construction capital cost for that project, or major project component, also has an economic service life of 20 years.

Present Worth

A 20-year planning period will be used in present worth calculations. This present worth planning period was also used in the 2000 DWSP.

Summary

Generally, definitions and cost estimating and economic criteria applied to the 2005 DWSP will be the same as those applied to the 2000 DWSP. The main exceptions are the cost basis, the land acquisition cost factor and the interest rate.

Exhibit C-1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan and East Central Florida Water Supply Initiative (Continued).

All 2005 DWSP costs will be estimated year 2005 costs; whereas, the 2000 DWSP was developed using March 1996 costs. The cost basis for the ECFWSPI projects and resulting update to the 2000 DWSP is April 2003.

The second change is the land acquisition factor. Land acquisition costs were estimated as 25% of land value for the 2000 DWSP. For the 2005 DWSP, this factor will vary depending upon condemnation status.

The final change is the interest rate used in the economic calculations. An interest rate of 7% was used for the 2000 DWSP and an interest rate of 6% is currently being used for the ECFWSPI and associated DWSP update. An interest rate of 5.875% will be used for the 2005 DWSP. The 2005 DWSP interest rate is equal to the current (FY03) federal water resources planning rate.

All other definitions and criteria remain unchanged.

Aquifer Storage and Recovery

Please refer to the following table (**Table C-1**) for Aquifer Storage and Recovery (ASR) Estimates.

Table C-1. Aquifer Storage and Recovery Estimates.

ASR Cost Estimate		
ASR Item	**2 MGD Potable Water ASR System**	**5 MGD Surface Water ASR System**
Construction		
ASR Well	$450,000	$650,000
Monitor Well	$-	$450,000
Surface Facilities	$350,000	$500,000
Piping	$25,000	$250,000
Discharge Structure	$-	$100,000
Water Treatment Facilities	$-	$3,500,000
Subtotal	$825,000	$5,450,000
Permitting/Design/CM	$165,000	$1,090,000
Total Construction Cost	$990,000	$6,540,000
Construction Cost per mgd	$495,000	$1,308,000
Annualized Costs	$28,300	$74,781
1+ie = 1 + effective rate	1.02960	1.02960
P/A	17.49	17.49
Operations & Maintenance		
Well	$10,000	$10,000
Water Quality Monitoring	$20,000	$100,000
Operators, Chemicals, etc.	$-	$100,000
Pumping/Electrical	$25,000	$80,000
O&M Cost (Annual)	$55,000	$290,000
O&M Cost (Annual) per mgd	$27,500	$58,000
Cost per 1,000 gallons	$0.44	$1.05
Assumptions		
Location	Co-located at Existing WTP	Remote from Existing WTP
Monitor Wells (Floridan)	None	One
Water Treatment (Recharge Only)	None additional	Micro filtration
Capacity (mgd)	2	5
Recoverability	70%	70%
Recharge (days)	180	180
Recovery (days)	126	126
Surface Facilities	Wellhead, pumps, valves, instrumentation, electrical	Wellhead, pumps, valves, instrumentation, electrical
Permitting/Design/CM	20% of construction cost	20% of construction cost
Facility Life Span (yrs)	25	25
Discount Rate	5.50%	5.50%
Inflation Rate	2.54%	2.54%

Notes:
Assumes seasonal operation of a south Florida-based ASR system (i.e., treat and store water during the wet season, pump it out in the dry season
CM = construction management
mgd = million gallons per day
WTP = Water Treatment Plant

WATER SUPPLY FUNDING

UEC Alternative Water Supply Funding

Please refer to the following table (**Table C-2**) for Alternative Water Supply (AWS) Grant Funding.

Table C-2. Alternative Water Supply Grant Funding.

Year	Applicant	Project	Approved Funding Amount	New Water (mgd)	Type
FY 1996-97	St. Lucie County	Reclaimed Water Ext - N. Hutchinson Island	$50,200	N/A	Reuse
	St. Lucie County	Reclaimed Water Ext - S. Hutchinson Island	$300,000	N/A	Reuse
FY 1997-98	Port St. Lucie	Concentrate Disposal Main	$300,000	N/A	Floridan
	Port St. Lucie	Floridan Wellfield & Raw Water Main	$300,000	N/A	Floridan
FY 1998-99	Jupiter Island	Stormwater Reuse	$200,000	0.10	Stormwater
	Port St. Lucie	Westport Reuse	$200,000	0.50	Reuse
	Martin County	Tropical Farms Ranney Collector Test Wells	$57,500	3.00	Floridan
	Martin County	N. Facility Floridan Well Equipment	$62,500	1.80	Floridan
	Fort Pierce	Floridan Aquifer Production Wells	$200,000	4.00	Floridan
	Port St. Lucie	Northport Reuse	$200,000	1.50	Reuse
FY 1999-00	Ft. Pierce	Reverse Osmosis Treatment Facility	$200,000	5.33	Floridan
	Martin County	N. Martin Floridan Well No. 4	$200,000	1.78	Floridan
	South Martin Regional	Two (2) Floridan Aquifer Supply Wells	$200,000	2.00	Floridan
	Jupiter Island Holdings	Irrigation Water Supply & Treatment	$200,000	0.25	Stormwater
FY 2001-02	South Martin Regional	Reverse Osmosis Treatment Facility	$300,000	2.00	Floridan
	Martin County	N. Martin Floridan Well 4 Wellhead	$300,000	0.00	Floridan
	St. Lucie County	Reclaimed Water Ext - N. Hutchinson Island	$82,800	0.17	Reuse
FY 2002-03	South Martin Regional	Ocean Outfall for RO By-product	$150,000	1.00	Floridan
FY 2003-04	Ft. Pierce	Reclaimed Water System	$100,000	1.00	Reuse
	Port St. Lucie	Westport Reclaimed Water System	$100,000	3.00	Reuse
	Martin County	North Reclaimed Water System Exp	$100,000	0.33	Reuse
	South Martin Regional	Reclaimed Water System Exp	$100,000	0.10	Reuse
	Martin County	Tropical Farms Floridan Wellheads	$100,000	3.90	Floridan
TOTAL (FY 1997 – FY 2004)			$4,003,000	31.76	

REFERENCES CITED

St. Johns River Water Management District. 1997. *Water Supply Needs and Sources Assessment: Alternative Water Supply Strategies Investigation, Water Supply and Wastewater Systems Component Cost Information*. Technical Publication SJ97-SP3. Law Engineering and Environmental Services, Inc. for SJRWMD, Palatka, FL.

St. Johns River Water Management District. 2003. *Cost Estimating and Economic Criteria for 2005 District Water Supply Plan and East Central Florida Water Supply Initiative (Third Draft) – Technical Memorandum*. CH2M Hill. Palatka, FL.